A NEW APPROACH TO SUSTAINABLE TRANSPORT SYSTEM: A CRITICAL APPRAISAL OF THE RAPID BUS TRANSIT SYSTEM (BRT) IN SOUTH AFRICA.

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Abstract
Public transport should be considered in the urban context as a good supportive infrastructure for public space. This can be considered based on the World Bank report of 1986 which considered public transport as the most efficient means of moving large numbers of people, especially in dense areas. Bus services; in particular provide considerable flexibility in meeting demands for transport at various levels of quality and quantity. One of the legacies of apartheid is the lack of connectivity between the so called "Townships" and the "Suburbs". Most residents commuting from the township to the city not only spend a huge amount of money to and from work. This impact greatly on their productivity as they get tired by the time they get to their places of work. To combat congestion and provide better public transport in the face of this concern the City of Johannesburg, Cape Town, Tshwane and Nelson Mandela Metro introduced the Rea Vaya BRT (Rapid Bus Transit system). This is a public transport infrastructure that is being used in developing countries with similar history like South Africa. The buses will run in exclusive, dedicated lanes in the centre of existing roads. Smaller feeder buses will bring people from the outer areas to the station on the trunk routes. The buses are of 75 or 112 capacity depending on passenger volumes and will operate in about 150 stations positioned half a kilometer apart to run every three minutes in peak times and every 10 minutes in off peak times from 5am to 12 midnight. Since the commencement of this public transport system the operators has witnessed stiff resistance and violent crashes with existing taxi operators. In this study we look at the viability of the BRT in terms of obtain a buy-in from existing operators. The research will question the sustainability of this rapid bus transport system in relation to Security, Affordability and travel time saving. The use of South Africa in this study is because this is the first time the Department of Transport is rolling out this system of Integrated Transport Plan which is backed with Strategic Public Transport Network.

Key Words: Public Transport, BRT, Integrated Sustainable Transport Plan and South Africa.

Introduction

Transport is a derived demand (Cervero, 2003, World Bank, 2008). It is not normally an end in itself but a means to more end(s). The end that it supports is the provision of

access to activities of all kinds. The concern is whether or not people can access key services at reasonable costs, in reasonable time and within reasonable ease (Chakwizea, 2009: 117). In 1986 the World Bank report on public transport policy proposed public transport as the most efficient means of moving large numbers of people, especially in dense areas. Bus services, in particular, provide considerable flexibility in meeting demands for transport at various levels of quality and quantity. In South Africa the provision of public transport has been characterized to serve the few. A large percentage of commuters use private vehicles. In the large metropolitan cities, the modal split is generally 50% private to 50% public transport going into the CBD. Generally the private commuters are single occupancy vehicle which leads to increased congestion and inefficient fuel consumption with associated high levels of carbon emissions. Makeke (2009:77) noted alarmingly in his research that transport sector is responsible for 25% of carbon emission in South African cities. This has serious implication on the Urban envelope and environment. Available public transport services differ across cities, in most cities there are bus and minibus taxi systems, with rail found in the main metropolitan cities, but not in the smaller cities. City bus and train systems provide the most efficient form of transport in terms of energy per commuter kilometer, however, even though these are by and large the same price or cheaper than minibus taxis, they are underutilized. This is due to the following reasons: inconvenience, Bus and train system do not service many informal settlements and are often not well linked in to an efficient network of transport system; unreliable reputation; perception that they are slower than taxis; safety concern, particularly on train; and express the need for large scale infrastructure to improve the current public transport system in order for it to improve its current share of commuters. South Africa spatial planning fragmentation challenge can be traced to the previous government spatial segregation policies which has an outcome of today settlement challenge that exhibit far reaching social transport ramifications such as; low-income settlements are located far way from areas of socio-economic opportunities such as industries and commercial centres; low income earners travel to work and socio-economic facilities takes approximately 65 minutes on average (DOT, 2003). Low income earners spend well over 10% of personal income on transport which is above the stipulated percentage contained the government white paper on transportation (Mokonyama et al, 2007); Low income residents have less family and bonding time with children. The bulk of their energy is consumed day walking or waiting for public transport. The high risk associated with this, especially with regard to safety is enormous. One of the biggest challenges facing South Africa's transport authority is traffic safety. The Country rank very high on accident fatality rates, with approximately 498,000 traffic accident, 46000 serious injuries, and 3000 traffic fatalities annually of which around 5,300 are pedestrians (RMT, 2008).

Review of Literature

Contemporary transport literature stretches the concept of transport sustainability and mobility beyond economic sustainability (World Bank, 1996, 2008, Litman, 2008). Poverty alleviation, distribution, equity and social services to the poor and marginalized strongly feature into the discussion covering sustainability ((Chakwizea, 2009: 117). Public transport by its very definition allows for the greatest access and movement in terms of quantity of users, and thus can act as an incredible boost for the function of public space (Makeka,

2009: 75). Scholars have argued in the literature for urban planning needs to incorporate a grid of continuous, direct public transportation channels across the metropolitan area. These channels should integrate different modes of public transport, and should be reinforced by high density building. This is not only to the great benefit of the people who will occupy the housing, but also contributes to the viability of the transport system; create a compact intensive and convenient city which operates in an integrated system which works well at the level of the lowest common denominator (Dewar and Uytenbogaardt, 1991). Many factors contributes to economic and social progress, but mobility is especially important because the ingredients of satisfactory life, from food and health to education and employment, are generally available only if there is adequate means of moving people, goods and ideas (Owen, 1987). Travel is in short both a sustainable and sustaining activity which cities rely on (Torne and Filmer-Sankey, 2003). Sustainable transport and mobility is underpinned by three values and principles namely, equity, accessibility and mobility (Chakwizira, 2009: 118). All these are undeniably aimed at improving the service levels of transport goods and services in a society. Transport equity principle and values focuses on making sure that the socio-economic benefits emanating from transport interventions is inclusive in meeting the needs of all segments of the society with particular emphasis on those with special needs such as the elderly, youths, children, disabled, women, lower income residents, those with mobility impairment, those without cars available, those living in deprived areas (Mashiri et al, 2007, World Bank, 2008 cited in Chakwizira, 2009). One other issue that scholars have expressed varied opinions in transport studies is on the relationship between accessibility and mobility. Accessibility should not be confused with mobility, especially in an attempt to understand public transport scenario in cities. Mobility refers to physical movement, but in general, increase mobility tends to increase accessibility. Cities and other major activities centers it is argued, tend to have a relatively poor vehicle mobility (due to congestion), but are socio-economically vibrant due to excellent accessibility. This can be explained due to activities that are clustered together and the existence of many travel options. In this regard accessibility is viewed as an over-arching and more comprehensive measure in the pursuit of socio-economic competitiveness (World Bank, 2008).

Objective of the Study

The objective of this study is to address the following issues:

To review the sustainability of the Rapid Bus Transit system in relation to security, affordability and travel time saving.

To investigate the relevance of BRT as component of both Integrated Transport Plan and Strategic Public Transport Network.

To analyze the contribution of BRT in restructuring the urban landscape in relation to human settlement and commuting.

To look at the challenges and gaps facing the Implementation of BRT scheme and Public Transport system in South Africa.

Methodology

This investigation will be based on literature review of both published and unpublished material as well as secondary data. The data used is mainly qualitative based on content analysis and review of Department of Transport Integrated Transport Plan policies and strategies. The findings will be contextualized to Johannesburg as a case because it is one of the provinces with high rate of migration and rapid urbanization with attendant acute public transport problem. The reason for using the city as a case is because the phenomenon under discussion is a real life context and will

shed light on the prospect of sustainable public transport in South Africa and beyond.

Sustainable Development Versus Transport Planning

Sustainable development has been the topic of many conferences and activities by transportation professionals and international agencies. The concept according to (Campagni, 1998) is aimed at launching a large scale political, economic and cultural project, harmoniously linking environment requirements with those of economic development, from a long term point of view. The Bruntland Report of the World Commission on Environment and Development called Our Common Future (WCED, 1987) defined sustainable development as " a process of change in which the exploitation of resources, the direction of investment, the orientation of technological investment, and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations". The most important elements being satisfaction of basic human needs and at the same time complying with available or affordable resources (e.g, environmental, financial and social) implying intergenerational justice (Zuidgeest, 2009: 3). Sustainable transport according to (Black, 2000) is satisfying current transport and mobility needs without compromising the ability of future generations to meet these needs. This definition is supported by (Akinyemi and Zuidgeest, 2000) who in their catalyst discussion of a sustainable transport system noted that it encompasses a transportation system that meets people's needs, i.e. in terms of mobility, accessibility and safety within the limits of available or affordable environmental, financial and social resources. Hence, sustainable transport system is seen as improving a transport system towards a sustainable developed system. According to Transport Research Board (2008: 4) sustainable transport system comprises of the following:

> "Allows the basic access and development needs of individuals, companies and society to be met safely and in a manner consistent with human and ecosystem health, and promotes equity within and between successive generation.
> Is affordable. Operates fairly and efficiently, offers a choice of transport mode and supports a competitive economy as well as balanced regional development
> Limits emission and wastes within the planets ability to absorb them, uses renewable resources at or below their rates of generation and uses non-renewable resources at or below the rates of development of renewable substitutes, while minimizing the impact on the use of land and the generation of noise"

Table 1. A Social Transport Sustainability Framework and assessment indicators

Economic	Social	Environmental	Governance
Accessibility quality	Equity / Fairness	Air pollution	Transport/Monitoring indicator framework
Traffic congestion	Impact on mobility/ disadvantaged	Climate Change	Transport Governance & Anti corruption strategy
Infrastrure cost	Affordability	Noise/Pollution	Transport/ Public expenditure/ Reviews/ Hearings
Consumer cost	Human health impacts	Water pollution	Government-wide anti-graft initiatives
Mobility barriers	Community liveability	Habitat and ecological degradation	Transport Governance, Accountability/ Action plan
Depletion of non renewable resources	aesthetic	DNRR	Transport Governance and integrity system

(Source: World Bank, 2008; Litman, 2008 and Chakwizia, et. Al 2009)

Background to South African Public Transport (BRT)

Bus Rapid Transit (BRT) was developed in Brazil during the 1970s to combat similar transportation issues to those that South Africa is facing presently. Since the conception of BRT, the system has been implemented in over 40 global locations, with another 80 currently in the planning stages, including New York and London (http://www.aa.co.za/home/news). The system also emerged as a necessary addition to the Beijing transport system, to reduce the number of privately owned vehicles on the road and carbon emissions generated by traffic. The system was effectively implemented by the city for the Beijing Olympic and has proved highly successful in attaining the objectives of efficiency, affordability, comfortable public transport. The question always arises as to: what is BRT? How is a BRT system different to the legion of buses that we currently have on the road, and most importantly, how will a BRT system improve the lives South Africa's daily commuters?

BRT is a road-based public transport system, which replicates systems used on the railroad. The system is designed to provide consistent service delivery which is affordable, fast, efficient and comfortable, and delivers a high degree of urban mobility. The buses will run from 05:00 AM to midnight everyday, with a buses arriving at station every 1 to 3 minutes during peak hours and every 10 minutes during off-peak hours. The system utilizes dedicated bus lanes, which will run down the centre of existing inner city roads (http://www.aa.co.za/home/news). These dedicated lanes will form the trunk services of the BRT system. The trunk services will be equipped with raised bus stations every 500m and will cover more than 300km of commuter routes. Articulated buses with a seating capacity of 75 or 112 people will service the trunk system. The trunk service will in turn be complimented by buses with a seating capacity of 60 passengers. These buses are small enough to operate kerbside and on the dedicated roads of the trunk system. This will allow BRT to operate outside of the confines of dedicated bus lanes. Feeder buses, with a seating capacity of 32 passengers, will be used to transport people from outlying areas into the trunk service areas. Park and ride facilities will be implemented to encourage people with their own cars to use the BRT system.

BRT ultimately means that your average commuter will be able to effectively navigate the city between 5 am and midnight every day. With the current commuter system, service delivery peaks during rush hours and then fizzles out shortly afterwards as a result of diminishing clientele. Service providers for the BRT system will be paid by the kilometer traveled on routes instead of per commuter carried. The immediate result of this is the elimination of reckless fast driving to meet daily targets and an emphasis on continuous service delivery which will ensure that service providers operate punctually and efficiently. BRT will also reduce the number of vehicles currently operating on our overburdened roads, and as a result carbon emission and traffic congestion. Du Toit (2009) noted that the buses employed in BRT system can operate on a variety of alternate fuels which can dramatically reduce pollution emission. The most notable alternative fuel currently used in BRT systems is compressed natural gas, which is widely used in both Europe and South America. The other unique feature is that handicapped and wheelchair bound commuters can now use public transport reliably for the first time, a thing that this segment of society has been denied over the years. In all BRT holds several advantages over other mass transit systems, most notable in terms of; cost, planning and construction time, capacity, flexibility and speed.

PROBLEM AND CHALLENGES FACING BRT AND PUBLIC TRANSPORT IN SOUTH AFRICA

Transport is a derived demand and as such it is therefore reasonable important that people can access key socio-economic services at reasonable costs in reasonable time and with reasonable easy. A number of issues have been noted by scholars in the literature that can constitute barrier to sustainable transport access and mobility. According to Chakwizira (2009: 119) transport can be a source of social exclusion and reinforce structural socio-economic poverty in several aspects which includes: Physical exclusion, Geographical exclusion, Economic exclusion, Time-based exclusion, Fear-based exclusion and Exclusion from facilities. One of the biggest challenge facing South Africa transport authorities is traffic safety. The country is very high on accident rates with approximate 498,000 traffic accidents, 46,500 serious injuries and 8,000 traffic fatalities annually of which around 5,300 are pedestrians (Chakwizira, 2009). The need to improve road safety is a top priority (RMTS, 2008). The pursuit of a World class sustainable public transport system has some challenges as can be seen in this study research, namely:

The United Taxi Association Forum an umbrella controlling the taxi industry have been incensed by the introduction of BRT as it is seen as having flexibility and compete with them for passengers, hence resulting in clashes (Alex News, 2009: 3).

Change in land values and land uses as consequence of transport improvement is likely to have impact on property market and development.

The erosion of once cherished public open spaces by barriers in the name of security not only make our remaining public space less secure, they shut down the sense of community that would help to strengthen public engagement. Public transport is vital to enable access and linkage between public spaces.

Many people encounter difficulty when travelling by public transport due to factors such as their age, health or disability. Mobility is not just about better connection between various modes it is also about quality of urban travel.

Current transport methods positively discourage human interaction which is the bedrock of urban living.

CONCLUSION AND RECOMMENDATION

The BRT (Rea Vaya) has revolutionalised transport cost through low public transport cost "enhancing transit oriented development". Reduced travel times as household get round the city within ample time with less fossil fuel consumption resulting to densification. Extended hours of operation is now making the city "a city that never sleeps" and has now become a location for inter-social encounters. High frequency along trunk corridors thereby improving public engagement and security Full access for passengers with special needs – One Paraplegic, Sibongile Msibi said "Our treatment from taxi drivers is shocking. We are always left behind, and are told that we are a waste of their time" (Alex News. 2009:3). Integrated fare structure through common fare system on all modes on the network is one unique attribute that observers have noted that distinguish Rea Vaya from existing taxi commuters. There is some challenges that cannot be swept under the carpet as it relates to increase in commercial market value of prime property that has now benefited from BRT access, loss of public space which has made the remaining public

space less secured and persistent resistance from existing taxi operators who have felt stiff competition from their previous oligarchic structure. As the debate on the sustainability of public transport can never have one size fit all solution there is need for scholars to intensify research in associated areas like: There is need for further research on gender-specific information on the target or beneficiary population to assess socio-economic benefits of roads and access to services. Household perception of their access to resources, services, opportunities, transport constraints and needs, priority problems can also be investigated. Cost-benefit analysis of the economic impact of transport cost on household income should form another area of interest.

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